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| 10/525,259 | 02/22/2005 | Margaret Sin Ka Wan | 13404US | 5000 |

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| EXAMINER | |
|---|---|
| FERNANDEZ, SUSAN EMILY | |
| ART UNIT | PAPER NUMBER |
| 1651 | |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/525,259 | WAN, MARGARET SIN KA | |
| | Examiner | Art Unit | |
| | SUSAN E. FERNANDEZ | 1651 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *12 November 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,2,5-16,18-20,25-30,35,36 and 49-56* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5-16,18-20,25-30,35,36 and 49-56* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 12, 2009, has been entered.

Claims 3, 4, 17, 21-24, 31-34, and 37-48 are cancelled. Claims 54-56 are new.

Claims 1, 2, 5-16, 18-20, 25-30, 35, 36, and 49-56 are pending and examined on the merits to the extent they read on the elected subject matter.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 2, 5-16, 18-20, 25-30, 35, 36, and 49-56 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The recitation in claims 1, 14, 16, 18, 20, and 54 that the polymer is not electrically conductive is considered new matter. The specification only speaks of two polymers, the polylactide compounds recited in claim 10, that are described in Tsurata et al. (US 5,389,098) as

not being electrically conductive (column 8, line 48). Furthermore, the other polymer described in the specification as being suitable for the methods is polycaprolactone (also recited in claim 19). However, polycaprolactone is taught to be electrically conductive polymeric material in Wang et al. (US 2007/0027532, page 42, paragraph [0678]). Therefore, the methods are not solely limited to the use of polymers that are not electrically conductive, and the electrically non-conductive polymers for use in the invention are solely limited to the polylactide compounds recited in claim 10 as the specification does not expressly state that any and all electrically non-conductive polymers are suitable. Thus, 1, 2, 5-16, 18-20, 25-30, 35, 36, and 49-56 are rejected under 35 U.S.C. 112, first paragraph.

The recitation in step (b) of claim 54 that the gaps are in the range of from about 25 microns to about 3000 microns in size, and the diameter of the polymer fibres is from about 2 microns to about 500 microns is considered new matter. Page 2, lines 17-19 recite that the gap size ranges up to 3000 microns and not "about 3000 microns," while the fibre diameter only ranges up to 500 microns and not "about 500 microns." Thus, claims 25, 26, 54, and 56 are rejected under 35 U.S.C. 112, first paragraph.

Because the specification as filed fails to provide clear support for the new claim language, a new matter rejection is clearly proper.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 5-16, 18-20, 25, 27-30, 35, 36, 50, 51 and 54-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sanders et al. (US 2003/0211130) in light of Stevens et al. (US 5,686,178) and Tsuruta et al. (US 5,389,098).

Sanders et al. teaches the creation of a target tissue substitute wherein a scaffold comprising one or more layers of one or more arrays of microfibers is provided to mimic the configuration of one or more structural elements in a target tissue, and then cells are cultured on the scaffold (page 1, paragraph [0006]). The microfibers can be made of poly-L-lactic acid/polycaprolactone co-polymers, polyglycolic acid (page 1, paragraph [0007]), or poly(lactic acid) (also known as polylactide) (page 5, paragraph [0052]). Stevens et al. points out that polyglycolic acid is a non-conductive substrate (column 3, lines 47-54) and Tsuruta et al. teaches that polylactide is an electrically insulating material and thus electrically non-conductive (column 8, line 48). To form the arrays of microfibers, electrospinning may be used wherein "…a polymer solution held by its surface tension at the end opening of a capillary tube is subjected to an electric field, charge is induced at the liquid surface." And then, a fine jet of the polymer solution travels to form fine fibers on a plate, screen, or mandrel. See page 5, paragraph [0050]. The polymer solution for electrospinning may also be a polymer melt (page 5, paragraph [0051]). Thus, Sanders et al. teaches supplying a liquid solution containing a biologically compatible polymer that is not electrically conductive dissolved in a liquid to a liquid outlet placed in the vicinity of a surface, subjecting the liquid solution from the outlet to an electric field to form polymer fibres on a surface.

As an array of microfibers is formed that may be arranged in multiple layers (page 1, paragraph [0009]), where the microfibers can be oriented at a defined angle with respect to adjacent fibers (page 5, paragraph [0057]), and the microfibers are designed to mimic the configuration of one or more structural elements in a target tissue (page 1, paragraph [0006]), Stevens et al. indeed teaches the creation of a three-dimensional continuous network of intercommunicating fibre portions with gaps between adjacent fibre portions. Moreover, given that cells are applied to the fibre scaffold to form a target tissue substitute (page 1, paragraph [0006]), the cell processes such as attachment, movement, growth, proliferation, and differentiation are facilitated by the fibre scaffold. Note that the cells cultured on the scaffold may be fibroblast cells (page 12, paragraph [0116]).

Sanders et al. also teaches that the microfibers have a diameter between about 1 micrometer to about 20 micrometers (page 1, paragraph [0007]) and that the gaps between adjacent microfibers range from about 10 micrometers to 100 micrometers (page 1, paragraph [0008]), thus meeting the size limitations recited in instant claims 1, 14, 20, 21, and 54.

Sanders et al. differs from the claimed invention in that it does not specify that the cells are mammalian cells such as human bone marrow fibroblastic cells, human adherent cells, and stem cells, the cell diameters, the relationship between the mammalian cell diameter and the fibre diameter or the fibre gap, or the relationship between the size of the cell surface receptors of the cells and the fibre diameter. However, it would have been obvious to have used any type of cell, including human bone marrow fibroblastic cells, human adherent cells, and stem cells, since the scaffold created by Sanders et al. may be provided for the different tissues and organs in the body (page 12, paragraph [0117]). In using a variety of cells, a wide range of cell diameters are

obvious, and thus the cell diameters can be 5-10 times greater than the fibre diameter and/or the fibre gap is greater than approximately half the cell diameter. Moreover, in rendering obvious the relationship between the cell diameters, the fibre diameters, and the fibre gaps, cell processes including attachment, movement, growth, proliferation, and differentiation are inherently facilitated. Thus, instant claims 1, 2, 5-9, 11-15, 20, 25, 27, 35, 36, 50, and 54 are rendered obvious.

Furthermore, it would have been obvious to have used a variety of fibre diameters and fibre gap sizes, including those recited in instant claims 16 and 18, since it would have been a matter of routine experimentation and optimization. Thus, instant claims 16, 18, 19, and 50 are rendered obvious.

Also, it would have been obvious to have used different types of polylactide, including those recited in instant claim 10, since Sanders et al. broadly teaches the used of polylactide. There would have been a reasonable expectation of success in substituting one polylactide for another. Thus, instant claim 10 is rendered obvious.

Additionally, it would have been obvious to have used a variety of solvents, including cell culture medium, water, acetone, ethanol, and DMEM, since they are known solvents, are deemed suitable for cell growth, and would allow for the formation of a polymer solution. Thus, instant claims 29, 55, and 56 are rendered obvious.

With respect to instant claims 28 and 51, it would have been obvious to have used any known method, including spraying, to apply the cells to the scaffold. There would have been a reasonable expectation of success is applying the cells by spraying since the cells can be present in a solution. Thus, instant claims 28 and 51 are rendered obvious. Also, it would have been

obvious to have added the cells to the polymer solution prior to supplying the polymer solution to the outlet since there would have been a reasonable expectation of success in applying the cells at any point of the preparation of the scaffold with cells. Thus, instant claim 30 is rendered obvious.

A holding of obviousness is clearly required.

Claims 1, 2, 5-16, 18-20, 25-30, 35, 36, and 49-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sanders et al., Stevens et al., and Tsuruta et al. as applied to claims 1, 2, 5-16, 18-20, 25, 27, 29, 35, 36, 50, and 54-56 above, and further in view of Coffee et al. (WO 98/03267).

As discussed above, Sanders et al., Stevens et al., and Tsuruta et al. render claims 1, 2, 5-16, 18-20, 25, 27-30, 35, 36, 50, 51, and 54-56 obvious. However, they do not expressly disclose that the fibers are directly applied to a target area of a mammalian body, such as a wound, to form the fibre scaffold in situ.

Coffee et al. discloses a method of depositing fibres on a surface, such as a wound on an animal to form a dressing (page 4, second paragraph). A solution comprising a biocompatible polymer is subjected to an electrohydrodynamic process in the vicinity of the surface (page 4, third paragraph).

At the time the invention was made, it would have been obvious to the person of ordinary skill in the art to have applied the fibers directly to a wound on a mammalian body to form the fibre scaffold of the Sanders invention in situ. One of ordinary skill in the art would have been motivated to do this since it would have resulted in a dressing for the wound and since the

application of a electric field is suitable for depositing fibres on a wound. Thus, instant claims 26, 49, 52, and 53 are rendered obvious.

***Response to Arguments***

Applicant's arguments filed November 12, 2009, and September 11, 2009 have been fully considered but they are not persuasive.

Applicant's arguments filed November 12, 2009 and September 11, 2009, have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Sanders et al.

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SUSAN E. FERNANDEZ whose telephone number is (571)272-3444. The examiner can normally be reached on Mon-Fri 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Wityshyn can be reached on (571) 272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Leon B Lankford/
Primary Examiner, Art Unit 1651

Susan E. Fernandez
Examiner
Art Unit 1651

sef